

University of Alaska Anchorage  
School of Education  
3211 Providence Drive  
Anchorage, Alaska 99508-8269

ED 581  
Professional Learning in Science Education:  
Paleontology in Denali

Summer 2022  
1 Credit, Graded P/NP

**Course Sponsor:** Alaska Geographic, Murie Science and Learning Center, Denali National Park

**Instructor:** Patrick Druckenmiller

**Educational Resource:** Paula Davis

**Primary Grading Instructor:** David Arnold

**Facilitating Instructor:** Jessica Brillhart

**Contact Information Address:** Alaska Geographic, Murie Science and Learning Center, P.O. Box 136, Denali Park, AK 99755

**Telephone:** (907) 683-6432

**Email address:** courses@alaskageographic.org

**Course Meeting Information**

**Location:** Murie Science and Learning Center (MSLC), Denali National Park & Preserve entrance

**Start and End Date:** July 22, 2022 to July 24, 2022

**Class Day(s) & Time(s):** July 22nd, 2022 6:30pm through July 24th, 2022 4pm, continuous residential course

**Final Project Due:** Final day of course

**Course Description:** It's been over 15 years since the first evidence of dinosaurs was found in Denali National Park. Since then, thousands of tracks and plant fossils have been discovered – and even a few bones – helping to paint a picture of an extinct Cretaceous ecosystem. In this field based course, paleontologist Patrick Druckenmiller, Director of the University of Alaska Museum of the North, will share his current research in Denali to better understand dinosaurs and their environment. Participants will learn how to recognize dinosaur tracks and other fossils and test this knowledge by visiting potential new sites. Participants will also learn some of the paleontological tools-of-the-trade and contribute to real research on Alaskan dinosaurs. Participants will consider

how to integrate their learning from this fieldwork course into their teaching or educational environments.

**Intended Audience:** Teachers and other interested educators

**Enrollment Restrictions:** None

**Course Prerequisite/Co-requisites:** None

**Course Design:**

- a. Requires 15 contact hours and approximately 30 hours of engaged learning.
- b. Does not apply to any UAA certificate or degree program.
- c. No UAA lab and/or materials fees beyond standard charges.
- d. This Murie Science and Learning Center course will be entirely field-based. Learning will be achieved through lectures, group discussions, field observations, and field activities. This course is based upon the collegial sharing, collaboration, and support of the participants and facilitator as a community of learners. Course activities will include common readings and group discussions, collective learning processes, peer coaching/mentoring, and reflective practices.

**Instructional Goals and Defined Outcomes:**

RESEARCH BASED THEORY/PRINCIPLES/PRACTICES/TRENDS (CONTENT)

1.0 Instructional Goals:

- a. This course will provide an understanding of how earth scientists decipher clues in the rock record to understand past environments and life.
- b. This course will focus on recognizing and identifying different kinds of plant and dinosaur fossils.

Defined Outcomes:

Students will:

- a. learn to identify different rock types associated with fossils.
- b. learn how to recognize different types of dinosaur track preservation.
- c. become familiar with distinguishing plant from meat-eating dinosaur tracks.
- d. explain the process by which a footprint becomes a fossil.
- e. recognize different types of plant fossils and how they are used to determine past climates.
- f. describe how we reconstruct the ancient Alaskan world in which these dinosaurs lived.

THEORY INTO PRACTICE (APPLICATION)

2.0 Instructional Goal:

- a. This course will help teachers develop hands-on lesson plans for teaching their students about paleontology and geology in the classroom.

Defined Outcomes:

Students will:

- a. Describe ways in which dinosaur tracks can be used teach earth science.
- b. Discuss local resources that can be found to “make” dinosaur tracks in order to demonstrate track types and preservation.
- c. Participants will describe how they will integrate their experiences into their teaching or educational environments.

## REFLECTION ON THEORY INTO PRACTICE (REFLECTION)

### 3.0 Instructional Goal:

Engage participants in discussions, reflective journaling and informal sharing about science instruction and how to incorporate gained knowledge and experience into their classrooms.

### Defined Outcome:

Participants will review and reflect upon the scientific information covered. Participants will complete a journal, reflecting on how the information can be shared with their students.

## RELATIONSHIP TO STANDARDS

### 4.0 Instructional Goal:

Familiarize participants with science content standards addressed by the strategies and concepts presented.

### Defined Outcome:

Participants will identify the Science-Content standards applicable to their classroom.

### **Writing Style Requirements:**

Participants' writing will reflect the clarity, conciseness, and creativity expected of post-baccalaureate certificated educators.

### **Attendance and Make-up Policy:**

Participants are expected to actively and collegially participate in all classes as a contributing member of a learning community. Attendance at every session is mandatory.

### **Course Assignments, Assessment of Learning, and Grading System:**

Course grading will be Pass/No Pass based upon the following:

- a. Participation 50%  
Participants will be expected to actively and collegially participate in discussions, activities, and other process experiences during the seminar.
- b. Final Project - Journal completion 50%  
Participants will complete journal assignments to be turned in to MSLC field guide on the last day of class. Assignments will include thoughtful reflection based upon seminar experience and an application plan of how participants will integrate issues and content discussed into their own classroom setting.

### **Quality of Work**

#### **Grade of "Pass"**

Passing work includes all components of the assignment and meets proficient criteria. It is focused, developed, supported, logical, and acceptable work with minimal errors. Work of this quality indicates understanding of key concepts and knowledge base.

#### **Grade of "No Pass"**

Work graded "No Pass" may lack key criteria/components of the task and show little or no evidence of conceptual understanding or knowledge utilization. Work may also show minimal or no organization/development and/or clear focus (may be difficult to follow) and may contain numerous errors. This grade indicates minimal or no knowledge or concept development. It may also mean that work was not attempted.

### Course Calendar/Schedule:

- Friday            6:00 p.m. – 6:30 p.m. Greeting and check in at MSLC  
                     6:30 p.m. – 7:30 p.m. Introduction, orientation & overview
- Where does Denali fit in the bigger picture of Alaskan dinosaurs?
  - What is a dinosaur?
  - Geological overview of Alaska/Denali
  - Geological time
  - Goals and objectives
- 7:30 p.m. – 9:00 p.m. Drive to MSLC Field Camp and settle in
- Saturday            9:00 a.m. – 5:00 p.m. Exploration of Denali
- We will hike (~1.5 hours) to a dinosaur track site.
  - Multiple stops during the hike will focus on identifying rock types and what they say about this area's geological history.
  - Dinosaur track preservation and identification will be taught at a locality where many tracks can be found.
- 6:00 p.m. – 8:00 p.m. Dinner and evening discussions
- We will recap the day's discoveries and discuss questions raised.
  - Hands-on teaching objects and maps will be used to highlight the process of interpreting earth history.
  - Dinosaur bones and teaching objects will provide context to understanding the types of dinosaurs that lived in Alaska.
  - Teacher study group to discuss the day's activities and how the information can be shared with students
  - Identify applicable science content standards addressed by course content
- Sunday            9:00 a.m. – 3:00 p.m. Continued exploration of Denali
- We will continue topics raised in Saturday's class.
  - We will apply this new knowledge to find new dinosaur tracks and interpret geology at other sites.
- 3:00 p.m. – 4:00 p.m. Return drive to park entrance

**Final Project Due:** last day of course

### Course Texts, Readings, Handouts, and Library Reserve:

#### Required Text/Materials:

Capps, D. (2011). *Paleoecology of Denali's Dinosaurs*. Retrieved from:  
<https://www.nps.gov/articles/denali-paleoecology-dinosaurs.htm>

Capps DM and Others. 2017. *Denali National Park and Preserve Geology Road Guide*. Denali National Park and Preserve. Denali Park, Alaska, pages 1-37 Link to free download of book retrieved from: <https://www.nps.gov/dena/learn/nature/denali.htm>

Denali National Park and Preserve. (n.d.) *Plants in the Age of Dinosaurs*. Retrieved from: [https://www.nps.gov/articles/denali-prehistoric-ecosystems.htm?utm\\_source=article&utm\\_medium=website&utm\\_campaign=experience\\_more&utm\\_content=small](https://www.nps.gov/articles/denali-prehistoric-ecosystems.htm?utm_source=article&utm_medium=website&utm_campaign=experience_more&utm_content=small)

Stewart, D. (2021). *Following in the footsteps of giants: Dinosaur tracks in Denali National Park and Preserve*. Park Paleontology News - Vol. 13, No. 1 Retrieved from: <https://www.nps.gov/articles/000/dena-dinosaur-tracks.htm>

#### Suggested Text/Material:

Bureau of Land Management (2018) *Dinosaurs on Alaska's North Slope*  
Retrieved from: [https://www.blm.gov/sites/blm.gov/files/documents/files/PublicRoom\\_AK\\_Dinosaurs-on-NorthSlope\\_booklet\\_2018.pdf](https://www.blm.gov/sites/blm.gov/files/documents/files/PublicRoom_AK_Dinosaurs-on-NorthSlope_booklet_2018.pdf)

Gangloff, Roland. (2012) *Dinosaurs Under the Aurora* Indiana University Press

National Park Service. (n.d.) *Fossils*.  
Retrieved from: <https://www.nps.gov/dena/learn/nature/fossils.htm>

National Park Service. (2021). *Fossils of the 2021 National Fossil Day Artwork*.  
Retrieved from: <https://www.nps.gov/articles/000/fossils-of-the-2021-national-fossil-day-artwork.htm>

#### Supplemental information can be found in the following sources:

##### Content References:

Fastovsky, D.E. & David B. Weishampel D.B., Sibbick J. (2016) *Dinosaurs: A Concise Natural History*. Cambridge University Press.

Fiorillo, A.R., Kobayashi, Y., McCarthy, P.J., Wright, T.C., and Tomsich, C.S., 2014c. Pterosaur tracks from the Lower Cantwell Formation (Campanian-Maastrichtian) of Denali National Park, Alaska, USA, with comments about landscape heterogeneity and habit preferences. *Historical Biology* 27(6), 672-683.

Spicer, R.A., and Herman, A.B., 2010. The Late Cretaceous environment of the Arctic: a quantitative reassessment based on plant fossils *Palaeogeography, Palaeoclimatology, Palaeoecology* 295(3-4), 423-442. Retrieved from: <https://www.akgeo.org/wp-content/uploads/2021/05/Spicer-and-herman-2010.pdf>

Tomsich, C.S, McCarthy, P.J., Fowell, and S.J., and Suderlin, D., 2010. Paleofloristic and paleoenvironmental information from the Late Cretaceous (Maastrichtian) flora of the lower Cantwell Formation near Sable Mountain, Denali National Park, Alaska. *Palaeogeography, Palaeoclimatology, Palaeoecology* 295, 389-408. Retrieved from: <https://www.akgeo.org/wp-content/uploads/2021/05/Tomsich-et-al-2010.pdf>

##### Standards References:

Alaska Comprehensive Center. (2012). *Guide to Implementing the Alaska Cultural Standards for Educators*. Juneau, AK: Alaska Department of Education and Early Development. Retrieved from: <https://education.alaska.gov/standards/cultural> and <https://www.asdn.org/wp-content/uploads/Implementing-AK-cultural-standards-1.pdf>

Alaska Native Knowledge Network. (1998). *Alaska standards for culturally responsive schools*. Fairbanks, AK: University of Alaska Press. Retrieved from: <http://www.ankn.uaf.edu/publications/culturalstandards.pdf>

National Research Council, the National Science Teachers Association, the American Association for the Advancement of Science, and Achieve. (2013). *The next generation science standards*. Retrieved from <http://www.nextgenscience.org/next-generation-science-standards>.

State of Alaska Department of Education and Early Development. (2016). *Content and performance standards for Alaska students*. Juneau, AK: Author. Retrieved from: <https://education.alaska.gov/akstandards/standards/ContentStandards.pdf>

State of Alaska Department of Education and Early Development. (2019). *K-12 Science Standards for Alaska*. Juneau, AK. Author. Retrieved from: <https://education.alaska.gov/akstandards/science/science-standards-for-alaska.pdf?v=1>

State of Alaska Department of Education and Early Development. (2012). *Alaska English/Language Arts and Math Standards*. Juneau, AK: Author. Retrieved from: [https://education.alaska.gov/akstandards/standards/ELA\\_and\\_Math.pdf](https://education.alaska.gov/akstandards/standards/ELA_and_Math.pdf)

### **Informed by the School of Education Vision, Mission, and Conceptual Framework:**

We believe that the preparation and support of professional educators is the shared responsibility of the University of Alaska Anchorage and our partners, and that our programs must evolve dynamically in response to unique community needs, research, and continuous program assessment. This PACE course is designed to meet a professional development need in response to our partner school districts and professional organizations. The course fits within the mission of the UAA School of Education as we encourage lifelong learning to meet the challenges of a rapidly changing world.

### **Link to Alaska Educator Content and Performance Standards:**

This professional development is rooted in the fundamentals of Alaska's standards for teachers, administrators, and beginning teachers in Alaska's Administrative Code, 4 AAC 04.200. It is offered to encourage and support practicing educators attain, maintain, or surpass the standards for effectively preparing today's students for successful lives and productive careers. (<https://education.alaska.gov/standards/other-standards>)

### **Learning Forward Standards for Professional Learning:**

This course is further informed by the Learning Forward Standards for Professional Learning which outline the "characteristics of professional learning that leads to effective teaching practices, supportive leadership, and improved student results." As explicit in the standards, "professional learning is for educators to develop the knowledge, skills, practices and dispositions they need to help student perform at a higher levels." (<https://standards.learningforward.org>)

### **Course Policies:**

#### **Incomplete Grades**

**Due to the nature of this course, grades of incomplete will not be permitted.**

#### **ADA Policy**

The provision of equal opportunities for students who experience disabilities is a campus-wide responsibility and commitment. Disabilities Support Services (DSS) is the designated UAA department responsible for coordinating academic support services for students who experience disabilities. To access support services, students must contact DSS (786-4530 or 786-4536 TTY) and provide current disability documentation that supports the requested services. Disability support services are mandated by Section 504 of the Rehabilitation Act of 1973 and

the Americans with Disabilities Act (ADA) of 1990. Additional information may be accessed at the DSS Office in RH 105 or on-line at [www.uaa.alaska.edu/dss](http://www.uaa.alaska.edu/dss).

### **Academic Dishonesty Policy**

Academic integrity is a basic principle that requires all students to take credit only for the ideas and efforts that are their own. Cheating plagiarism, and other forms of academic dishonesty are defined as the submission of materials in assignments, exams, or other academic work that is based on sources prohibited by the faculty member. Academic dishonesty is defined further in the "student Code of Conduct." In addition to any adverse academic action that may result from the academically dishonest behavior, the University specifically reserves the right to address and sanction the conduct involved through student judicial review procedures and the Academic Dispute Resolution Procedure specified in the University catalog.

### **Professional and Ethical Behavior**

University of Alaska Anchorage School of Education students are expected to abide by the State of Alaska Code of Ethics of the Education Profession and professional teaching standards as they concern students, the public, and the profession. The standards, adopted by the Professional Teaching Practices Commission, govern all members of the teaching profession. A violation of the code of ethics and professional teaching standards are grounds for revocation or suspension of teaching certification.

### **Technology Integration**

University of Alaska Anchorage School of Education students are expected to (a) demonstrate sound understanding of technology operations and concepts; (b) plan and design effective learning environments and experiences supported by technology; (c) implement curriculum plans that include technology applications in methods and strategies to maximize student learning; (d) facilitate a variety of effective assessment and evaluation strategies; (e) use technology to enhance productivity and professional practice; and (f) understand the social, ethical, and human issues surrounding use of technology in PreK-12 schools and apply those principles in practice.

### **Course Safety and Risk**

This course is sponsored by Alaska Geographic and the Murie Science and Learning Center. The University of Alaska Anchorage provides the credit option for interested participants. This course takes place entirely outdoors and within a remote area of Alaska. Field courses, such as this, do have inherent risks. These risks will be outlined in the Alaska Geographic Acknowledgement of Risk form and by the course instructors. The Acknowledgement of Risk form will be provided at the time of registration and a signed copy is required in order to attend.

### **Non-Discrimination Policy**

The University of Alaska is an affirmative action/equal opportunity employer and educational institution. The University of Alaska does not discriminate on the basis of race, religion, color, national origin, citizenship, age, sex, physical or mental disability, status as a protected veteran, marital status, changes in marital status, pregnancy, childbirth or related medical conditions, parenthood, sexual orientation, gender identity, political affiliation or belief, genetic information, or other legally protected status. The University's commitment to nondiscrimination, including against sex discrimination, applies to students, employees, and applicants for admission and employment. Contact information, applicable laws, and complaint procedures are included on UA's statement of nondiscrimination available at [www.alaska.edu/nondiscrimination](http://www.alaska.edu/nondiscrimination).